

### REMARKS

Reconsideration and allowance are respectfully requested in light of the above amendments and the following remarks.

Claims 19 and 27 are amended to emphasize the patentable features of this invention. The particular amendments are discussed in detail below.

Claims 19-30 stand rejected under 35 USC 103(a) as unpatentable over Bussgang (USPN 3,909,721). The reliance on Riddle has been withdrawn. It is submitted that claims 19-30 are allowable over the applied prior art for at least the following reasons.

#### Summary of Present Invention

Features of the present claimed invention include:

(a) inputting first information and second information through different routes (where the first information is more important than the second information) and generating an information sequence including the first information and the second information; to illustrate the different routes, Fig. 3 shows important information and transmission data input to respective S/P converters 301 and 302;

(b) performing modulation in such a way that one symbol is expressed using three or more bits on an orthogonal coordinate system composed of an in-phase component and a quadrature component (for example, 8PSK or 16QAM); and

(c) arranging a bit corresponding to the first information on at least the first bit of each symbol of the information sequence. See claims 19 and 27.

Moreover, the invention includes:

(d) arranging a bit corresponding to the first information on one or both of the first bit and the second bit of each symbol of the transmission symbol. See claims 21 and 29.

Moreover, the invention includes:

(e) using the first information for error control. See claims 19 and 27.

Feature (e) is added by the present amendment and has an advantage of transmitting important information for use for error control to the receiving end with certainty to maintain normal communication, thereby improving transmission efficiency while maintaining the transmission quality of the important information. This is supported by the original specification at page 1, lines 21-25 ("This important information refers to a kind of information

that is likely to make it difficult to maintain normal communication if the other end of communication has a poor error rate characteristic during reception.") (see also page 9, lines 1-3); and page 6, lines 4-8 ("Normally, there is a limit to the number of retransmission times of certain information and if retransmission is not completed within this limit, error correction is not carried out for this information."). In other words, the present specification describes determining whether or not the transmission data is correct at the data receiving end and detecting errors. The present specification also discloses requesting data retransmission of important information to the transmission source and performing error correction based on important information. The important information is for use for error control to maintain normal communications at the receiving end, refers to highly important information, and requires good error rate characteristics. Generally, error control involves error correction and retransmission, such as with turbo code, for example.

#### Prior Art Rejection

Bussgang discloses a type of system for processing an analog signal that has been quantized by a sampling technique to produce, for example, an eight bit PCM signal, wherein the eight bits have varying importance (bit X01 being the most important and bit X71

being the least important). The quantized data is encoded so that the more significant bits are afforded more protection from error during transmission.

Contrasting the present claimed invention with Bussgang (USPN 3,909,721), the present invention has the above-noted feature (e) relating to first information used for error control. On the other hand, as will be apparent from the detailed discussion below, Bussgang's most important bits are not used for error control. Thus, Bussgang lacks above-noted feature (e) of the present invention.

More particularly, in Bussgang, the "information" (e.g. bits X01-X07) refers to an A/D converted analog signal. In particular, the information bit X01 that the Final Rejection alleges is equivalent to the first information of the present claims merely refers to the most significant bit in the A/D converted signal and refers to the information for D/A converting the signal back to the original analog signal upon reception. D/A conversion and error control bear no relationship with one another.

As noted above, the Final Rejection analogizes bit X01 to the claimed "first information." Bussgang's bit X01 is the most significant bit of the PCM sequence and is formatted within the encoding scheme to position it in the transmitted data so as to enhance its reliability. It is the processing and positioning of

bit X01 that enhances its reliability, and bit X01 itself is not "information used for error control." In fact, Bussgang's error correction is done by decoder and error corrector 73 which uses a matrix syndrome technique (see col. 11, line 38 et seq.). In Bussgang, bit X01 of the transmitted signal is not part of the means for correcting errors in the decoded data information to produce corrected data information.

Thus, Bussgang lacks above-noted feature (e) of the present invention of using the first information for error control, as recited in claims 19 and 27.

The Final Rejection at page 3, lines 16-20, asserts that bit X01 is used to "process" bits X11-X71 of the PCM sequence. However, X01 is used not to process other bits but rather it is used in obtaining the quantized amplitude level per the formula at col. 3, lines 66-67. Instead, in Bussgang, if the quality of bit X01 is poor, this affects the result of reconstructing of the sample point in accordance with the formula at col. 3, lines 66-67, but this does not affect the quality of reception of bits X11-X71. Conversely, while Bussgang's approach may improve the quality of bit X01, this does not lead to quality improvement of bits X11-X71.

In view of the above, it is submitted that the information bit X01 noted by the Final Rejection does not constitute, and is not

equivalent to, information used for error control as recited in the present claims.

Further, the present invention has above-noted feature (a) of inputting first information for use for error control and second information through respective routes and generating an information sequence including the first information and the second information. Bussgang contains no disclosure or suggestion equivalent to this particular feature of the invention, as will be apparent from the following points.

Bussgang's information (bits X01-X07) constitutes information in which an analog signal of a single sequence is quantized. As illustrated in the input signal to block 10 in Fig. 1, Bussgang's information refers to a single sequence of information. However, given the nature of an A/D converter, signals are shown to be output in parallel according to the number of quantized bits. For example only, when eight bits are A/D converted, eight output sequences are provided. Consequently, it is respectfully submitted that the understanding shown in the Final Rejection that, in Bussgang's Fig. 11, each line of line 11 represents an individual sequence is incorrect. Instead, the eight lines labeled 11 together constitute the digital data of a single quantized sample point.

Incidentally, Bussgang outputs a single information sequence in parallel in accordance with the number of quantized bits, requiring signal rearrangement and raising the problem of complex processing and increased circuit scale.

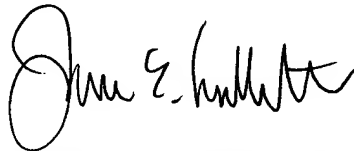
Referring back to the present invention, there is a technical relationship between the present claimed feature that (1) important information (first information) is for use for error control and requires good error rate characteristics and the present claimed feature that (2) such important information and other information (second information) are provided through different routes. This is explained below in conjunction with retransmission information as one example of first (important) information for error control.

To begin with, retransmission information and other information are generated in different layers. Generally, retransmission information is generated in the physical layer (layer 1). In contrast, normal information is generated in a higher layer than the physical layer (layer 1). Because retransmission information and other information are generated in different layers, they are not generated in one sequence. At least partly for this reason, the retransmission information and other information are provided in separate sequences.

Accordingly, it is submitted that the present claims are not rendered obvious by the teachings of Bussgang et al. A notice of allowance is respectfully solicited.

If any issues remain which may best be resolved through a telephone communication, the examiner is requested to telephone the undersigned at the local Washington, D.C. telephone number listed below.

Respectfully submitted,



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